The Environment

Air quality worsened in 2003, particularly for ozone pollution partly due to weather conditions.

The Environment

Air Quality

Why is this important?

Good air quality is vital for the health of residents, nature and the economy. Human health effects of air pollution can range from lung irritation to cancer and premature death. Ecological effects include damage to crops and contamination of waters. Degradations in human and ecological health often adversely impact economic well-being.

How are we doing?

Air quality is a function of both the rate and location of pollutant emissions under the influence of meteorological conditions and topographic features.[1] The SCAG region includes four air basins: South Coast, Mojave Desert, Salton Sea and South Central Coast (Ventura County portion) (see Map on page 83). The South Coast Air Basin includes an area of approximately 6,480 square miles with more than 15 million residents in 2003, about 85 percent of the region's total population. It includes all of Orange County and the non-desert areas of Los Angeles, Riverside and San Bernardino counties. The Salton Sea and the Mojave Desert air basins have a combined area of approximately 32,200 square miles. The two basins include the desert portions of Los Angeles, Riverside and San Bernardino counties as well as Imperial County. Ventura County is part of the South Central Coast Air Basin (SCCAB). Air masses can move from basin to basin. As a result, pollutants such as ozone and particulate matter can be transported across air basin boundaries.

The U.S. Environmental Protection Agency, shortly after its creation in 1970, developed regulations targeting six "criteria" pollutants that adversely affect human health and welfare: ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. Of these, the first three pollutants are regionally significant, with various parts of the SCAG region showing moderate to extreme levels of pollution. Because of their significance, this report focuses on the first three pollutants.



Air pollution consistently ranks high among public concerns in Southern California, and control efforts have been a high priority in recent decades. Despite significant improvements in the past two decades, the South Coast Air Basin still has some of the worst air quality in the nation in terms of the annual number of days exceeding federal standards.

Ozone

Currently, all four air basins in the region are designated as non-attainment areas for ozone. Ozone is a colorless, poisonous gas. Ground level ozone is a major component of urban and regional smog. Ozone is a strong irritant, which can reduce lung function and aggravate asthma as well as lung disease. Repeated short-term ozone exposure may harm children's developing lungs and lead to reduced lung function in adulthood. In adults, ozone exposure may accelerate the natural decline in lung function as part of the normal aging process.[2]

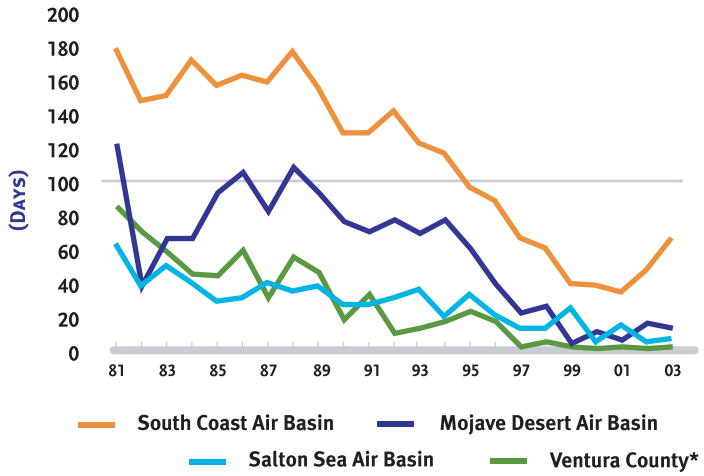
In 2003, ozone pollution worsened significantly in the South Coast Air Basin with no major changes in the other three air basins in the region (Figure 50). *In the most populous South Coast Air Basin, the number of days exceeding the federal one-hour ozone standard increased from 49 to 68 days from 2002 to 2003, more than any other air basin in the nation.* This followed the increase from 36 to 49 days during the previous period. The number of days for health advisories in the South Coast Air Basin increased from 18 to 36 from 2002 to 2003.[3]

Within the region, the East San Bernardino Valley surpassed the federal one-hour ozone standard for a total of 38 days in 2003, more than any other area in the nation.[4] Other areas that had higher exceedances included Santa Clarita Valley (35 days), Central San Bernardino Mountains (34 days) and the Banning Airport area in Riverside County (27 days). The maximum 1-hour ozone concentration in the South Coast Air Basin also increased from 0.169 ppm (parts per million parts of air) in 2002 to 0.194 ppm in 2003, the highest since 2000.[5]

It should be noted that, in the first 11 months in 2004, ozone pollution in the South Coast Air Basin improved significantly, exceeding the federal standard only 28 days compared to 64 days during the same period in 2003. Ozone is not directly emitted, but is formed when volatile organic compounds (VOCs) and oxides of nitrogen (NOx) emissions react in the presence of sunlight. In both 2002 and particularly 2003, the much hotter weather associated with a persistent high-pressure system trapped ozone gases at lower altitudes and contributed to the sharp increase of ozone pollution. In 2004, much milder weather contributed to the significant reduction of ozone pollution.

Beginning in June 2005, transportation investment must conform to the new 8-hour ozone standard. In 2003, the South Coast Air Basin exceeded the federal 8-hour standard by 120 days, an increase from 99 days in 2002.

Figure 50
Ozone Pollution in Non-attainment Air Basins
(Number of Days Exceeding Federal One-hour Standard)



** Ventura County is part of the South Central Coast Air Basin*

Source: California Air Resources Board and South Coast Air Quality Management District

In the South Coast Air Basin, emissions of the ozone precursors NOx and reactive organic gases (ROG) have been decreasing since 1975. The decreases are predominantly due to motor vehicle controls and reductions in evaporative emissions. The on-road motor vehicles are the largest contributors to ozone precursors, contributing about 70 percent of NOx and 40 percent of ROG.

PM_{10}

PM_{10} is particulate matter with diameter of 10 microns or smaller. Exposure to particulate matter aggravates a number of respiratory illnesses and may even cause early death in people with existing heart and lung disease. Both long-term and short-term exposure can have adverse health impacts.

Particulate matter can be directly emitted into the air in the form of dust and soot. In addition, similar to ozone, secondary particles can be formed in the atmosphere from the reaction of gaseous precursors such as oxides of nitrogen (NOx), oxides of sulfur (SOx), reactive organic gases (ROG) and ammonia. Secondary particles are more easily formed in the atmosphere during colder winter conditions. On an annual basis, directly emitted PM_{10} emissions contribute approximately 65 percent of the ambient PM_{10} in the South Coast Air Basin.

Three air basins in the region have been designated as non-attainment areas for PM_{10}, including the South Coast, Salton Sea and Mojave Desert. The annual average indicator provides a measure of long-term exposure to particulate matter that could contribute to breathing disorders, reduce lung function, and curtailed lung growth in children.

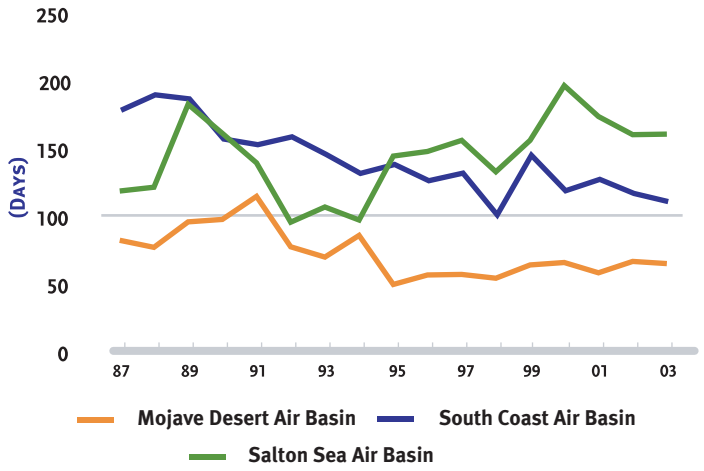
Since 1987, the South Coast Air Basin has been exceeding the Federal annual average standard of 50 ug/m3 (micrograms per cubic meter of air) but with a trend toward improvement (Figure 51). In 2003, there was only a slight reduction from 2002 in the PM_{10} annual average in the South Coast Air Basin. Exceedances of the federal annual standard in the South Coast Air Basin were confined to Riverside County with a maximum of 56.9 ug/m^3 (or 114 percent of the federal standard).[6]

In the Salton Sea Air Basin, the PM_{10} pollution level has been fluctuating since 1987. The Salton Sea Air Basin has contained the highest level of PM_{10} annual average within the SCAG region since 1995. In 2003, the annual average of PM_{10} pollution in the Salton Sea Air Basin remained almost at the same level as in 2002. In the Mojave Desert Air Basin, PM_{10}pollution level has been below the federal annual average standard since 1992.

Figure 51

PM_{10} in Non-attainment Air Basins

(Percent of Federal Annual Average Standard*)



** Above 100 percent means exceeding the federal standard. Also PM10 condition may be impacted significantly by natural events or pollution transport.*

Source: California Air Resources Board

In 2003, the number of days exceeding the federal 24-hour standard (150ug/m^3) for PM_{10} increased in all three non-attainment basins. The number of days with an unhealthy level of PM_{10} describes the chronic extent of PM_{10} pollution. The South Coast Air Basin exceeded the federal standard on 6 days in 2003. There had been no days of exceedance in 2002. The Salton Sea Air Basin experienced an increase from 18 to 28 days of exceeding the federal standard during the same period. The Mojave Desert exceeded the federal 24-hour standard for PM_{10} on 8 days, an increase from 6 days from the previous year.

Figure 52

PM_{10} Pollution in Non-attainment Air Basins

	Days Exceeding Federal PM_{10} 24-hour Standard		
Air Basins	**2001**	**2002**	**2003**
South Coast	5	0	6
Mojave Desert	0	6	8
Salton Sea	29	18	28

Source: California Air Resources Board

California state standards for PM_{10} are significantly more stringent than federal standards due to greater consideration given to the potential health impacts. Specifically, the state annual average standard for PM_{10} of 20 ug/m^3 is only 40 percent of the federal standard of 50 ug/m^3. In 2003, all three non-attainment basins for PM_{10} have continued to exceed the state standards. In addition, the state 24-hour standard for PM_{10} of 50 ug/m^3 is only a third of the federal standard of 150 ug/m3. In 2003, the South Coast and Salton Sea Air Basins exceeded the state standard on 211 and 284 days respectively, while the Mojave Desert Air Basin exceeded the state standard on 18 days.[7]

Direct emissions of PM_{10} in the South Coast Air Basin have increased from 233 to 288 tons per day between 1975 and 2000. This is primarily because of the increase from areawide sources that increased from 140 to 233 tons per day during the 25-year period. The areawide sources include fugitive dust from paved and unpaved roads. While emission controls implemented for ozone will also benefit PM_{10}, more controls aimed specifically at reducing PM_{10} will be needed to reach attainment.

$PM_{2.5}$

$PM_{2.5}$ is a subgroup of finer particles within the classification of PM_{10}. They pose increased health risks because they can penetrate deeper in the lung than PM_{10} and contain substances that are particularly harmful to human health. The U.S. EPA promulgated national $PM_{2.5}$ standards in 1997.

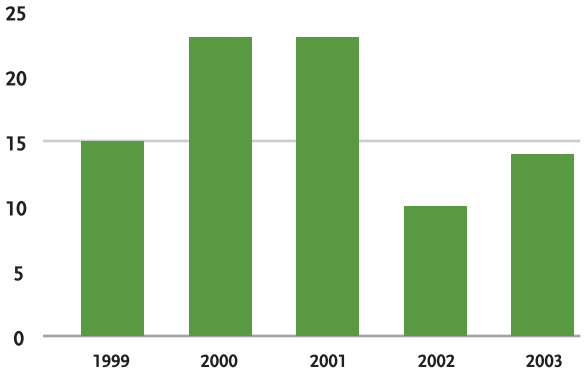
While the annual average concentration of 24.9 ug/m3 in the South Coast Air Basin declined in 2003 from the previous year (27.5 ug/m^3), it continued to far exceed the federal standards of 15 ug/m^3.[8] Specifically, 12 of the 17 monitoring stations in the basin showed exceedance, ranging from coastal cities to inland valleys.

$PM_{2.5}$ particles on average are smaller than PM_{10} particles and are more difficult to control. In 2003, while the South Coast Air Basin exceeded the federal 24-hour standard for PM_{10} on 8 days, it exceeded the federal 24-hour standard for $PM_{2.5}$ on 14 days, an increase from 10 days in 2002.

$PM_{2.5}$ concentrations, like PM_{10}, were high in the inland valley areas of San Bernardino and Riverside counties. However, $PM_{2.5}$ concentrations were also high in the metropolitan areas of Los Angeles and Orange counties. The high $PM_{2.5}$ concentrations in these areas are mainly due to the secondary formation of smaller-sized particulate resulting from mobile and stationary source activities.

On an annual basis, directly emitted $PM_{2.5}$ emissions contribute approximately 40 percent of the ambient $PM_{2.5}$ in the South Coast Air Basin. Among the directly emitted $PM_{2.5}$ emissions, close to 60 percent are from areawide sources, while 30 percent are from mobile sources and another 10 percent are from stationary sources.

Figure 53
$PM_{2.5}$ Pollution in the South Coast Air Basin
(Number of Days Exceeding Federal 24-Hour Standard)



Source: South Coast Air Quality Management District

Carbon Monoxide

Carbon monoxide is a colorless and odorless gas that is directly emitted as a product of combustion. Incomplete combustion will result in increased carbon monoxide emissions. Motor vehicles generate almost 85 percent of carbon monoxide emissions in the region. Since 1975, total emissions of carbon monoxide in the South Coast Air Basin have been reduced by almost 70 percent even though vehicle miles traveled have been increasing. On-road motor vehicle emission controls have been primarily responsible for this significant improvement.

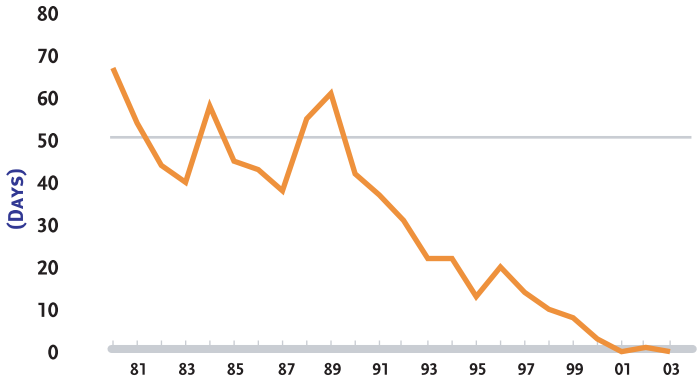
Carbon monoxide impairs the ability of blood to carry oxygen. It is especially dangerous to infants, the elderly and people with heart or respiratory problems. Exposure to high levels of carbon monoxide can result in headaches, dizziness, fatigue, slow reflexes and death.

In 2002, the South Coast Air Basin met federal attainment standards for carbon monoxide (with no violation in 2001 and the one day allowable exceeding the federal standard in 2002). The basin continued to have no violation for carbon monoxide in 2003 (Figure 54). In the past two decades, peak 8-hour carbon monoxide levels also decreased in the South Coast Air Basin from 26 ppm in 1980 to 7.3 ppm in 2003.[8]

Figure 54

Carbon Monoxide (CO) in the South Coast Air Basin

(Number of Days Exceeding Federal 8-Hour Standard)



Source: South Coast Air Quality Management District

Water Resources

Total Water Use

Why is this important?

Water is essential to human life. With the continuing significant increase of population in the region, ensuring reliable water resources to meet demands and maintaining water quality are vital goals for all of Southern California.

How are we doing?

Southern California depends on both imported and local sources to meet its demand for water. This includes imported water from the Colorado River, the State Water Project via the California Aqueduct, and eastern Sierra Nevada via the Los Angeles Aqueduct. *Together, depending on the rainfall level, imported water generally accounts for about 70 to 75 percent of the regional water supply.* The remaining 25 to 30 percent comes from local surface and ground water sources and from reclaimed water sources.[9] *It is important to note that available water from all three imported sources may be reduced in the future as other users and uses place greater demands on these sources.*

Within the SCAG region, the Metropolitan Water District (MWD) is the largest urban water supplier. Its service area includes close to 15 million residents in the region (Figure 55). In recent years, MWD has provided about half of the municipal, industrial and agricultural water used in its service area.

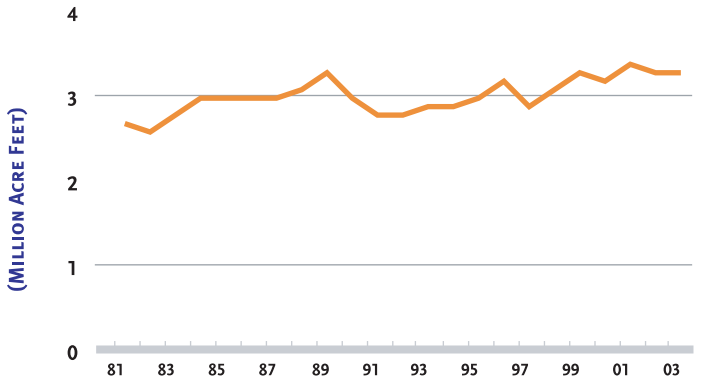
Figure 55
Population within Water District Service Area

	MWD	Non-MWD
Imperial	0.0%	100.0%
Los Angeles	92.0%	8.0%
Orange	100.0%	0.0%
Riverside	72.1%	27.9%
San Bernardino	41.0%	59.0%
Ventura	71.6%	28.4%
REGION	85.0%	15.0%

Source: Metropolitan Water District

In 2003, total water consumption at 3.3 million acre-feet represented a 3 percent decline from 2002. The 2003 level was only slightly higher (or 1.4 percent) than the 1990 level, despite an increase of almost 2.3 million residents since 1990 (Figure 56). Within the MWD service area in the SCAG region, total water consumption did not experience significant increases for several years in the mid-1990s due to the recession, wet weather, conservation efforts, and lingering drought impacts. Of total consumption, only 7.5 percent was for agricultural purposes and the rest was for urban (municipal and industrial) uses.

Figure 56
Total Water Consumption*
(Metropolitan Water District Service Area)



** Within the SCAG region. Total water consumption includes municipal/ industrial and agricultural uses.*
***One acre foot equals 325,851 gallons.*

Source: Metropolitan Water District with 2001, 2002, and 2003 estimates by SCAG.

While the MWD serves a significant portion of the SCAG region, many communities within the region are served by water districts outside the MWD service area. Total water consumption within the region but outside the MWD service area was estimated to be more than 4.8 million acre-feet in 2003.

The water agencies outside MWD range from relatively small to very large water suppliers. The most significant difference in water use between the MWD and non-MWD service areas is the agricultural demand for water. While less than 8 percent of all water in the MWD service area was for agricultural purposes in 2003, more than 85 percent of all water used outside the MWD area was for agricultural purposes.

In 2003, MWD opened Diamond Valley Lake, the Southland's largest reservoir with a capacity of 800,000 acre-feet. In addition, MWD gained three new partners for ground water storage, improving the region's reliability in dry years by arranging for additional storage in wet years. Finally, the Inland Feeder, a $1.2 billion water distribution project which will nearly double MWD's water delivery capacity after its completion, is still under development.

Per Capita Urban Water Use

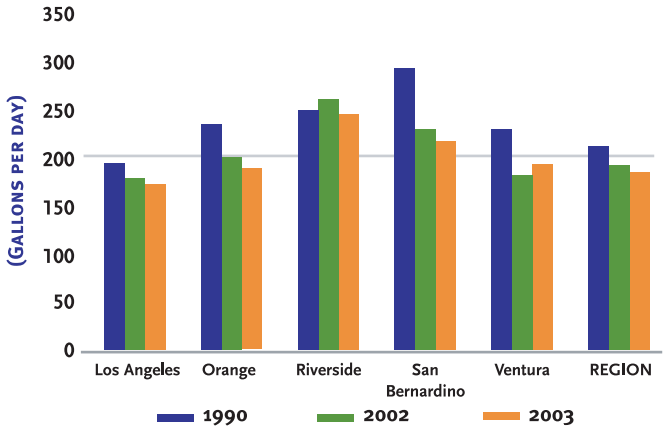
Why is this important?

Water consumption per capita is important when looking at a city or county's growth projections in order to maintain a safe yield per person and sustain community well-being.

How are we doing?

Per capita water consumption for urban uses has generally been declining since 1990. Within the MWD service area it decreased from 210 gallons in 1990 to 191 gallons in 2002 and 183 gallons in 2003 (Figure 57). Between 2002 and 2003, per capita water consumption increased only in Ventura County while it decreased in Los Angeles, Orange, Riverside and San Bernardino counties. Urban water use includes residential, commercial, industrial, fire fighting and other uses. Hence, per capita urban water use consists of more than the amount of water used directly by an individual.

Figure 57
Per Capita Urban Water Consumption*
(Metropolitan Water District Service Area)



**Includes Retail Municipal and Industrial uses, not Agricultural use. Not including San Diego County.*
***San Bernardino's portion includes only 41% of the County's total population, significantly less than other counties.*

Source: Metropolitan Water District, with 2002 and 2003 estimates by SCAG.

An important factor contributing to the overall decline in per capita urban water consumption is the development of various conservation programs and practices. These include retrofitting with water efficient technology for showerheads and toilets and changing landscaping practices toward drought tolerant plants. In addition, implementation of new water rate structure has helped suppress growth in per capita water demand.

In Southern California, much of the variation in per capita water use among counties can be attributed to climate differences. Within the region, the Inland Empire counties continued to maintain higher per capita urban water consumption rates than coastal counties. For example, in 2003, per capita urban water consumption per day in Riverside County was 243 gallons in contrast to 187 gallons in Orange County and 171 gallons in Los Angeles County.

This partly reflects higher landscape water use due to warmer and dryer climate conditions. In addition, a single family unit has higher per capita water use than a multi-family unit. The Inland Empire has much higher share (72 percent) of single-family residential units than Los Angeles County (55 percent) or Orange County (63 percent).

Beach Closure

WHY IS THIS IMPORTANT?

When the ocean waters off a beach contain high concentrations of certain bacteria, they become unsafe for swimming and other recreational uses. In 1999, the California Department of Health began monitoring all beaches which have more than 50,000 annual visitors and have outflows from storm drains, rivers, or creeks. Closures or advisories are issued for beaches that fail to meet the state's standards for various sources of bacterial pollution.

HOW ARE WE DOING?[10]

In 2003, due largely to bacterial contamination from unknown sources, more pollution reached coastal waters in Southern California. *Among the 97 beaches monitored in the region, the total number of beach closing/advisory days increased from 3,000 to 3,508 between 2002 and 2003.* The increase of 17 percent of beach closing/advisory days was similar to the increase at the state level during the same period, from 4,553 to 5,384, or 18 percent.

Los Angeles County experienced a record of 1,459 beach closing/advisory days in 2003, the highest among all California counties. Following Los Angeles County were Orange County (1,329 beach closing/advisory days), San Diego County (896) and Ventura County (720).

Between 2002 and 2003, the number of beach closing/advisory days in Los Angeles County jumped from 913 to 1,459, a 60 percent increase following three years of steady declines. The increase did not appear to correlate with increased rainfall or increased monitoring, but may be attributable to an on-going failure to identify and control contamination sources. Almost 97 percent of total beach closing/advisory days in the county in 2003 were due to elevated bacterial levels from unknown sources. The remaining three percent were preemptive rain advisories.

Ventura County experienced a 73 percent increase from 416 to 720 beach closing/advisory days between 2002 and 2003, after significant reductions during the previous period. Among the three coastal counties in the region, only Orange County enjoyed a reduction of beach closing/advisory days, from 1,671 to 1,329 (or -20 percent) between 2002 and 2003.

Similar to conditions in Los Angeles County, more than 90 percent of total beach closing/advisory days in Orange and Ventura counties in 2003 were due to elevated bacterial levels from unknown sources.

Solid Waste

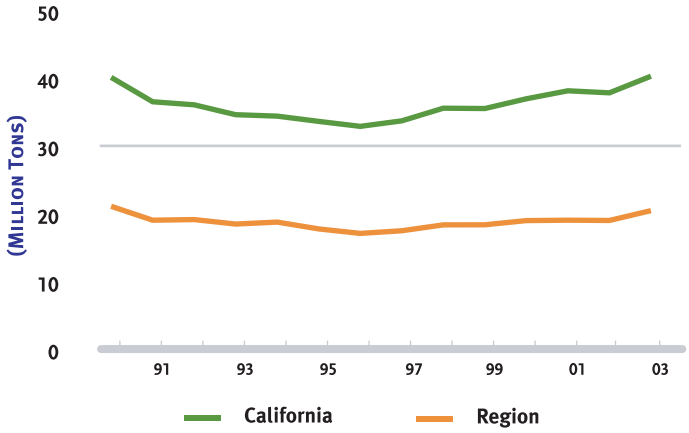
Why is this important?

Disposing of waste in landfills is not only costly but, if not treated properly, could have dire impacts on the ecosystem and human health. For example, decomposition of waste in landfills releases methane into the atmosphere, a significant contributor to global warming. Hence, a sustainable society would minimize the amount of waste sent to landfills by reducing, recycling or reusing the waste generated as much as possible.

How are we doing?

The 1989 California Integrated Waste Management Act set the goal of 50 percent diversion of each city and county's waste from landfill disposal by the year 2000. Diversion measures include waste prevented, waste re-used, waste recycled or waste composted. Waste diversion programs such as curbside recycling pickups, greenwaste collection, and municipal composting have steadily increased the diversion rate. *At the statewide level, the diversion rate – the share of amount diverted out of the total waste generated - increased from 10 percent in 1989 to 48 percent in 2002, and dropped slightly to 47 percent in 2003.*[11] Increase in construction activity in 2003 contributed to the increase of disposal rate and decrease of diversion rate at the state level. Hence among the 76 million tons of waste generated in California in 2003, over 35 million tons were diverted, with almost half estimated to be from the SCAG region.

Figure 58
Solid Waste Disposal at Landfills (Million Tons)



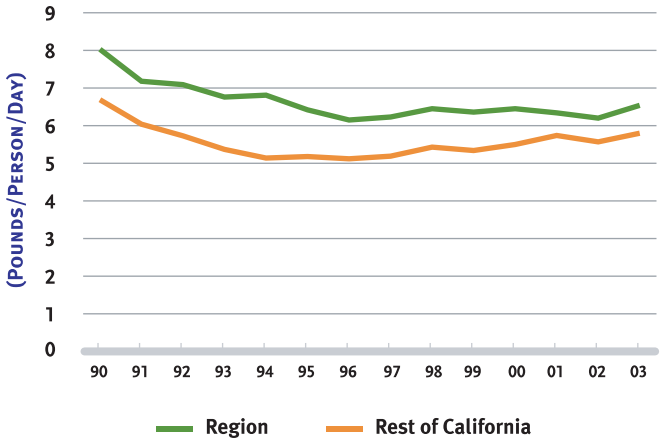
Source: California Integrated Waste Management Board

In 2003, the total amount of waste disposed to landfills in the region reached nearly 21 million tons, a higher level than any year since 1990 (Figure 58). During the 1990s, waste sent to landfills in the region declined for several years, however, it has increased gradually since 1996. This is similar to the trend at the state level.

Within the municipal waste stream, high-tech electronics are now the fastest growing component due to the widespread use of electronic instruments such as Personal Computers (PCs) and DVD players. Currently, more than 2 million tons of high-tech electronics are dumped in the nation's landfills each year, and only about 10 percent of discarded PCs are recycled. High-tech electronics contain dozens of materials, complicating separation and recycling. In addition, many of the substances are harmful to human and environmental health. The U.S. EPA estimates that discarded electronics accounts for approximately 70 percent of the heavy metals and 40 percent of the lead now found in the nation's landfills.[12]

Since the passage of the Waste Management Act in 1989, the region began to make progress in reducing the amount sent to landfills on a per capita basis. In 1990, the region disposed about 8 pounds of solid waste per capita per day into the landfills, slightly higher than that of the rest of the state. Various measures to implement the Act had reduced the per capita disposal rate in the region continuously to just over 6 pounds per day (or almost 25 percent) in 1996, the lowest level since 1990. However, since 1996, per capita disposal rates fluctuated between 6.1 and 6.5 pounds per day. Between 2002 and 2003, per capita disposal rate increased from 6.2 pounds to 6.5 pounds per day, continuing to be higher than that of the rest of the state (Figure 59).

Figure 59
Solid Waste Disposal at Landfills



** Including residential and non-residential waste disposal.*

Source: California Integrated Waste Management Board, California Department of Finance


AIR BASINS
in the SCAG Region
MDAB
SCAB
SSAB
VC SCCAB
Ports
Major Airports
Ports of Entry
Freeway
Highway
County
Source: California Air Resources Board and Air Districts
South Central Coast Air Basin
South Coast Air Basin
Mojave Desert Air Basin
Salton Sea Air Basin
Los Angeles
Ventura
San Bernardino
Riverside
Orange
Imperial
Kern
Santa Barbara
San Diego
Nevada
Arizona
Mexico
PACIFIC
OCEAN
Barstow
Needles
Palmdale
Victorville
Santa Clarita
Pasadena
Malibu
Torrance
Newport Beach
Temecula
Palm Springs
Blythe
Winterhaven
Mexicali
Tijuana
N
SOUTHERN CALIFORNIA ASSOCIATION of GOVERNMENTS
October 2004